CLAIMS

What is claimed is:

1. A method for navigating a UAV, the method comprising orbiting a waypoint, including:

defining four bracket lines surrounding a waypoint, wherein the bracket lines identify a range of latitude and a range of longitude;

flying the UAV from a course segment having coordinate values in a range into a course segment not having coordinate values in the range, wherein a bounding bracket line defines a boundary between the segments;

selecting, when the UAV enters the course segment not having coordinate values in the range, a heading parallel to a bracket line in dependence upon an orbital direction and a direction from a range exit position to the waypoint;

turning the UAV in the orbital direction to fly on the heading;

repeatedly carrying out the steps of:

flying the UAV from a course segment having coordinate values in a range into a course segment not having coordinate values in the range, wherein a bounding bracket line defines a boundary between the segments;

turning the UAV in the orbital direction to fly on a heading parallel to the

bounding bracket line.

2. The method of claim 1 wherein selecting a heading parallel to a bracket in dependence upon an orbital direction and a direction from a range exit position to the waypoint comprises turning in the orbital direction to fly on a heading that is parallel to a bracket line and no more than ninety degrees from the direction from the range exit position to the waypoint.

3. The method of claim 1 further comprising receiving a user's selection of orbital direction.

4. The method of claim 1 further comprising dispatching the UAV, including:

receiving in a remote control device a user's selection of a GUI map pixel that represents a waypoint for UAV navigation, the pixel having a location on the GUI;

mapping the pixel's location on the GUI to Earth coordinates of the waypoint;

transmitting the coordinates of the waypoint to the UAV;
reading a starting position from a GPS receiver on the UAV; and

piloting the UAV from the starting position to the waypoint in accordance with a navigation algorithm.

5. The method of claim 3 wherein mapping the pixel's location on the GUI to Earth coordinates of the waypoint further comprises:

mapping pixel boundaries of the GUI map to Earth coordinates;

identifying a range of latitude and a range of longitude represented by each pixel; and

locating a region on the surface of the Earth in dependence upon the boundaries, the ranges, and the location of the pixel on the GUI map.

6. The method of claim 4 wherein locating a region on the surface of the Earth in dependence upon the boundaries, the ranges, and the location of the pixel on the GUI map further comprises:

multiplying the range of longitude represented by each pixel by a column number of the selected pixel, yielding a first multiplicand;

multiplying the range of longitude represented by each pixel by 0.5, yielding a second multiplicand;

adding the first and second multiplicands to an origin longitude of the GUI map;

multiplying the range of latitude represented by each pixel by a row number of the selected pixel, yielding a third multiplicand;

multiplying the range of latitude represented by each pixel by 0.5, yielding a fourth multiplicand; and

adding the third and fourth multiplicands to an origin latitude of the GUI map.

7. The method of claim 1 further comprising:

receiving user selections of a multiplicity of GUI map pixels representing waypoints, each pixel having a location on the GUI

mapping each pixel location to Earth coordinates of a waypoint;

assigning one or more UAV instructions to each waypoint;

transmitting the coordinates of the waypoints and the UAV instructions to the UAV;

storing the coordinates of the waypoints and the UAV instructions in computer memory on the UAV;

piloting the UAV to each waypoint in accordance with one or more navigation algorithms; and

operating the UAV at each waypoint in accordance with the UAV instructions for each waypoint.

8. A system for navigating a UAV, the system comprising orbiting a waypoint, including:

means for defining four bracket lines surrounding a waypoint, wherein the bracket lines identify a range of latitude and a range of longitude;

means for flying the UAV from a course segment having coordinate values in a range into a course segment not having coordinate values in the range, wherein a bounding bracket line defines a boundary between the segments;

means for selecting, when the UAV enters the course segment not having coordinate values in the range, a heading parallel to a bracket line in dependence upon an orbital direction and a direction from a range exit position to the waypoint;

means for turning the UAV in the orbital direction to fly on a the heading;

means for flying the UAV from a course segment having coordinate values in a range into a course segment not having coordinate values in the range, wherein a bounding bracket line defines a boundary between the segments; and

means for turning the UAV in the orbital direction to fly on a heading parallel to the bounding bracket line.

9. The system of claim 8 wherein means for selecting a heading parallel to a bracket in dependence upon an orbital direction and a direction from a range

exit position to the waypoint comprises means for turning in the orbital direction to fly on a heading that is parallel to a bracket line and no more than ninety degrees from the direction from the range exit position to the waypoint.

10. The system of claim 8 further comprising means for receiving a user's selection of orbital direction.

11. The system of claim 8 further comprising means for dispatching the UAV, including:

means for receiving in a remote control device a user's selection of a GUI map pixel that represents a waypoint for UAV navigation, the pixel having a location on the GUI;

means for mapping the pixel's location on the GUI to Earth coordinates of the waypoint;

means for transmitting the coordinates of the waypoint to the UAV;
reading a starting position from a GPS receiver on the UAV; and

means for piloting the UAV from the starting position to the waypoint in accordance with a navigation algorithm.

12. The system of claim 11 wherein means for mapping the pixel's location on the GUI to Earth coordinates of the waypoint further comprises:

means for mapping pixel boundaries of the GUI map to Earth coordinates;

means for identifying a range of latitude and a range of longitude represented by each pixel; and

means for locating a region on the surface of the Earth in dependence upon the boundaries, the ranges, and the location of the pixel on the GUI map.

13. The system of claim 12 wherein means for locating a region on the surface of the Earth in dependence upon the boundaries, the ranges, and the location of the pixel on the GUI map further comprises:

means for multiplying the range of longitude represented by each pixel by a column number of the selected pixel, yielding a first multiplicand;

means for multiplying the range of longitude represented by each pixel by 0.5, yielding a second multiplicand;

means for adding the first and second multiplicands to an origin longitude of the GUI map;

means for multiplying the range of latitude represented by each pixel by a row number of the selected pixel, yielding a third multiplicand;

means for multiplying the range of latitude represented by each pixel by 0.5, yielding a fourth multiplicand; and

means for adding the third and fourth multiplicands to an origin latitude of the

GUI map.

14. The system of claim 8 further comprising:

means for receiving user selections of a multiplicity of GUI map pixels representing waypoints, each pixel having a location on the GUI

means for mapping each pixel location to Earth coordinates of a waypoint;

means for assigning one or more UAV instructions to each waypoint;

means for transmitting the coordinates of the waypoints and the UAV instructions to the UAV;

means for storing the coordinates of the waypoints and the UAV instructions in computer memory on the UAV;

means for piloting the UAV to each waypoint in accordance with one or more navigation algorithms; and

means for operating the UAV at each waypoint in accordance with the UAV instructions for each waypoint.

15. A computer program product for navigating a UAV, the computer program product comprising orbiting a waypoint, including:

a recording medium;

means, recorded on the recording medium, for defining four bracket lines surrounding a waypoint, wherein the bracket lines identify a range of latitude and a range of longitude;

means, recorded on the recording medium, for flying the UAV from a course segment having coordinate values in a range into a course segment not having coordinate values in the range, wherein a bounding bracket line defines a boundary between the segments;

means, recorded on the recording medium, for selecting, when the UAV enters the course segment not having coordinate values in the range, a heading parallel to a bracket line in dependence upon an orbital direction and a direction from a range exit position to the waypoint;

means, recorded on the recording medium, for turning the UAV in the orbital direction to fly on a the heading;

means, recorded on the recording medium, for flying the UAV from a course segment having coordinate values in a range into a course segment not having coordinate values in the range, wherein a bounding bracket line defines a boundary between the segments; and

means, recorded on the recording medium, for turning the UAV in the orbital direction to fly on a heading parallel to the bounding bracket line.

16. The computer program product of claim 15 wherein means, recorded on the recording medium, for selecting a heading parallel to a bracket in dependence upon an orbital direction and a direction from a range exit position to the waypoint comprises means, recorded on the recording medium, for turning in the orbital direction to fly on a heading that is parallel to a bracket line and no more than ninety degrees from the direction from the range exit position to the waypoint.

17. The computer program product of claim 15 further comprising means, recorded on the recording medium, for receiving a user's selection of orbital direction.

18. The computer program product of claim 15 further comprising means, recorded on the recording medium, for dispatching the UAV, including:

means, recorded on the recording medium, for receiving in a remote control device a user's selection of a GUI map pixel that represents a waypoint for UAV navigation, the pixel having a location on the GUI;

means, recorded on the recording medium, for mapping the pixel's location on the GUI to Earth coordinates of the waypoint;

means, recorded on the recording medium, for transmitting the coordinates of the waypoint to the UAV;

reading a starting position from a GPS receiver on the UAV; and

means, recorded on the recording medium, for piloting the UAV from the starting position to the waypoint in accordance with a navigation algorithm.

19. The computer program product of claim 18 wherein means, recorded on the recording medium, for mapping the pixel's location on the GUI to Earth coordinates of the waypoint further comprises:

means, recorded on the recording medium, for mapping pixel boundaries of the GUI map to Earth coordinates;

means, recorded on the recording medium, for identifying a range of latitude and a range of longitude represented by each pixel; and

means, recorded on the recording medium, for locating a region on the surface of the Earth in dependence upon the boundaries, the ranges, and the location of the pixel on the GUI map.

20. The computer program product of claim 19 wherein means, recorded on the recording medium, for locating a region on the surface of the Earth in dependence upon the boundaries, the ranges, and the location of the pixel on the GUI map further comprises:

means, recorded on the recording medium, for multiplying the range of longitude represented by each pixel by a column number of the selected pixel,

yielding a first multiplicand;

means, recorded on the recording medium, for multiplying the range of longitude represented by each pixel by 0.5, yielding a second multiplicand;

means, recorded on the recording medium, for adding the first and second multiplicands to an origin longitude of the GUI map;

means, recorded on the recording medium, for multiplying the range of latitude represented by each pixel by a row number of the selected pixel, yielding a third multiplicand;

means, recorded on the recording medium, for multiplying the range of latitude represented by each pixel by 0.5, yielding a fourth multiplicand; and

means, recorded on the recording medium, for adding the third and fourth multiplicands to an origin latitude of the GUI map.

21. The computer program product of claim 15 further comprising:

means, recorded on the recording medium, for receiving user selections of a multiplicity of GUI map pixels representing waypoints, each pixel having a location on the GUI;

means, recorded on the recording medium, for mapping each pixel location to Earth coordinates of a waypoint;

means, recorded on the recording medium, for assigning one or more UAV instructions to each waypoint;

means, recorded on the recording medium, for transmitting the coordinates of the waypoints and the UAV instructions to the UAV;

means, recorded on the recording medium, for storing the coordinates of the waypoints and the UAV instructions in computer memory on the UAV;

means, recorded on the recording medium, for piloting the UAV to each waypoint in accordance with one or more navigation algorithms; and

means, recorded on the recording medium, for operating the UAV at each waypoint in accordance with the UAV instructions for each waypoint.